

00222T 99E2460

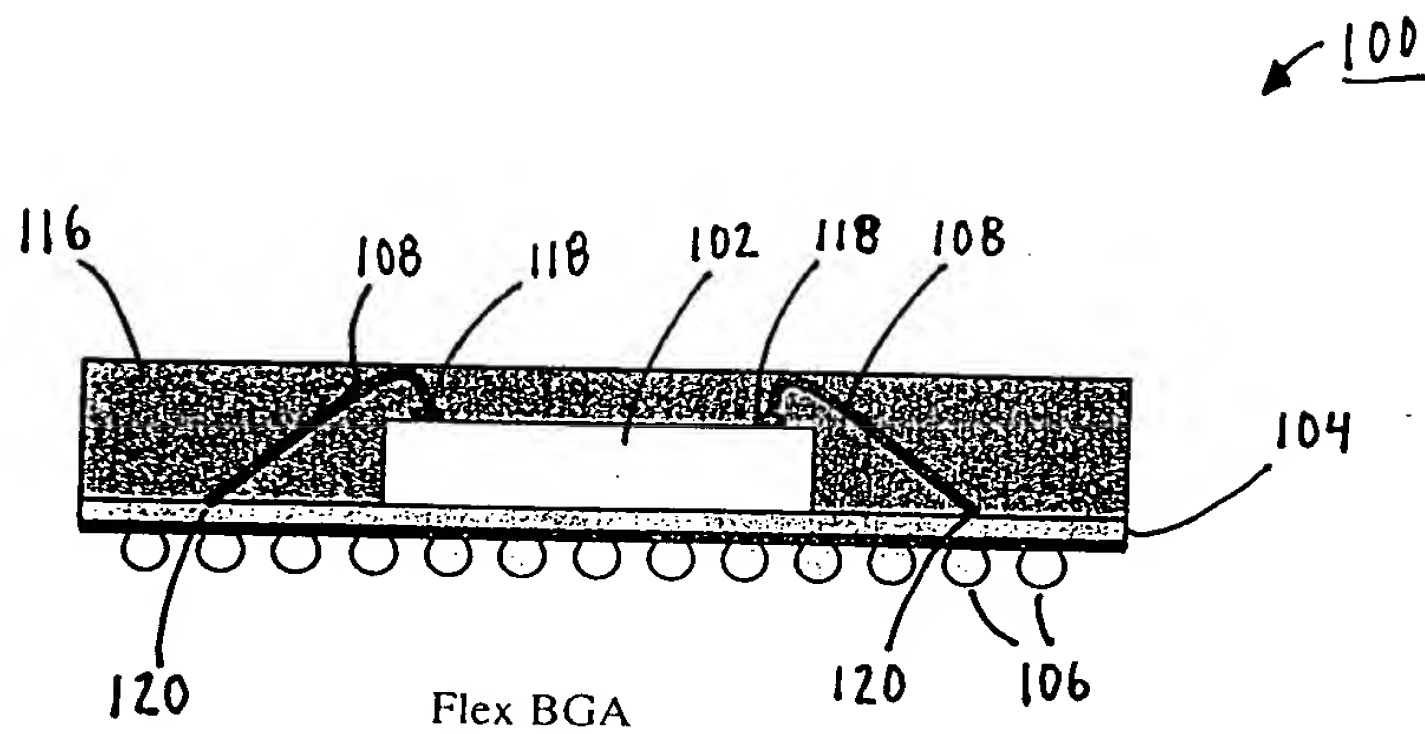


FIG. 1A

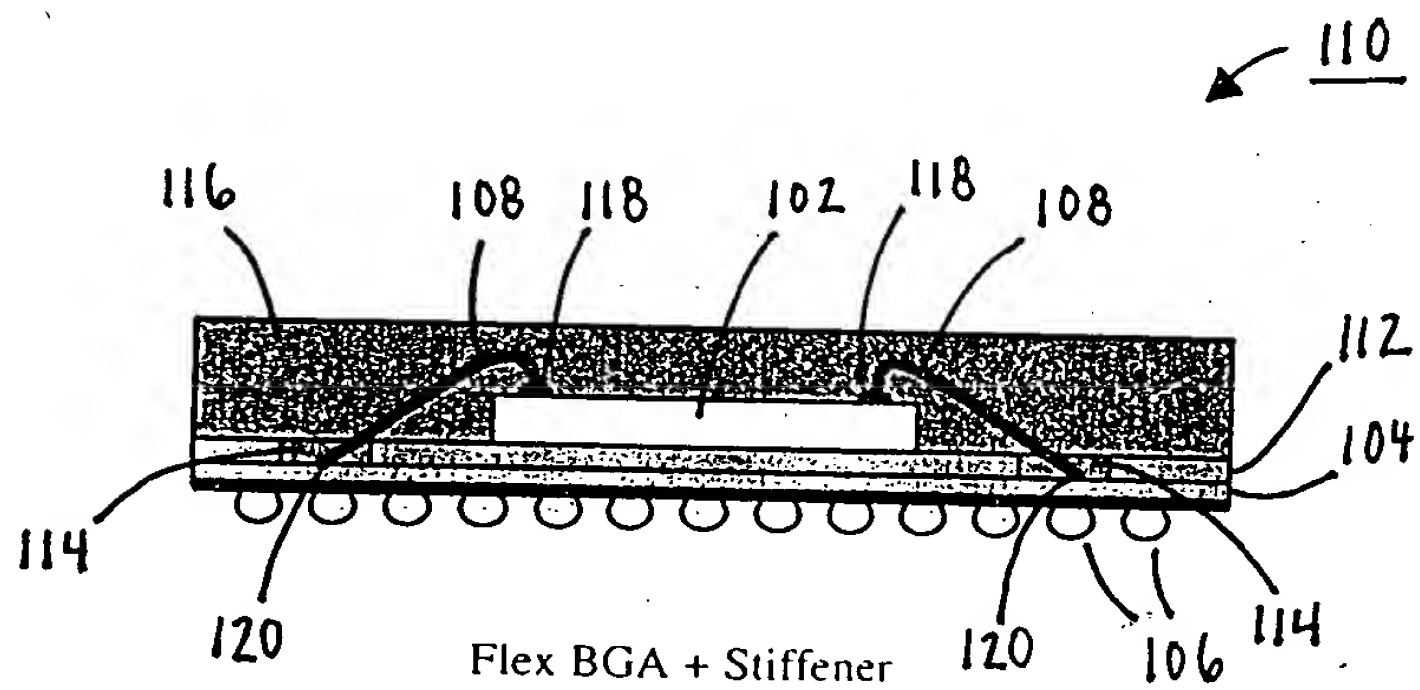


FIG. 1B

09742366-122200

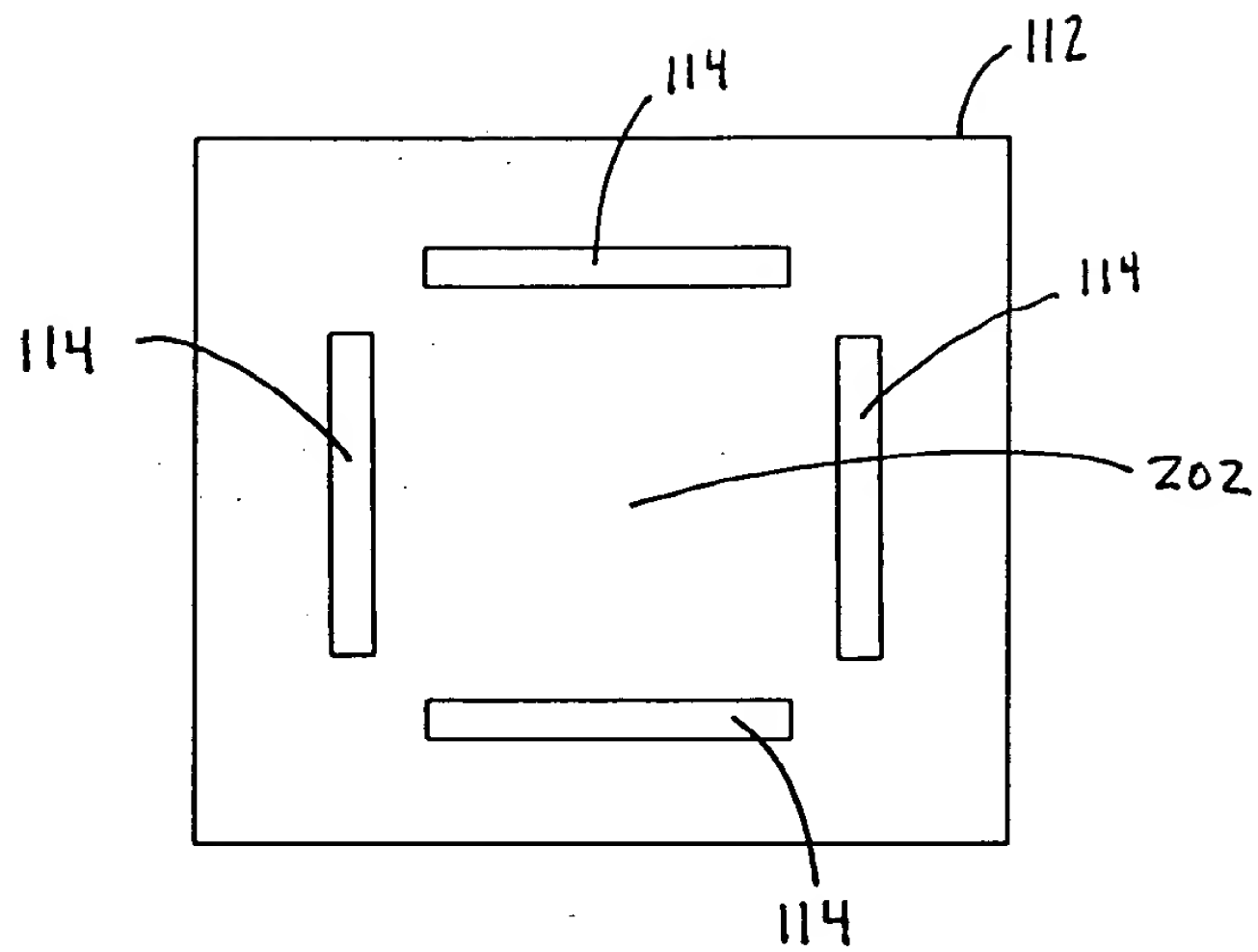


FIG. 2A

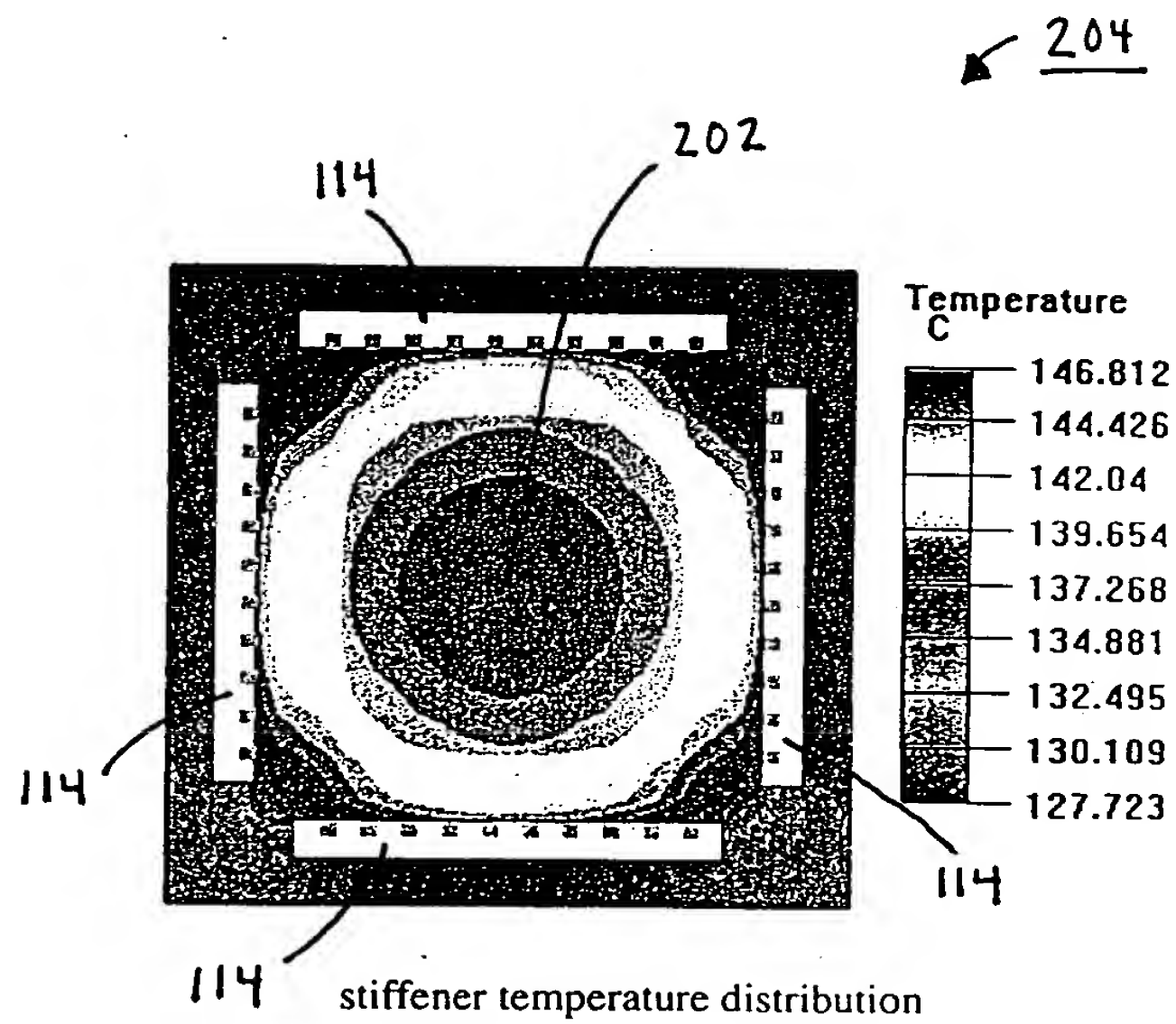


FIG. 2B

09742366-122200

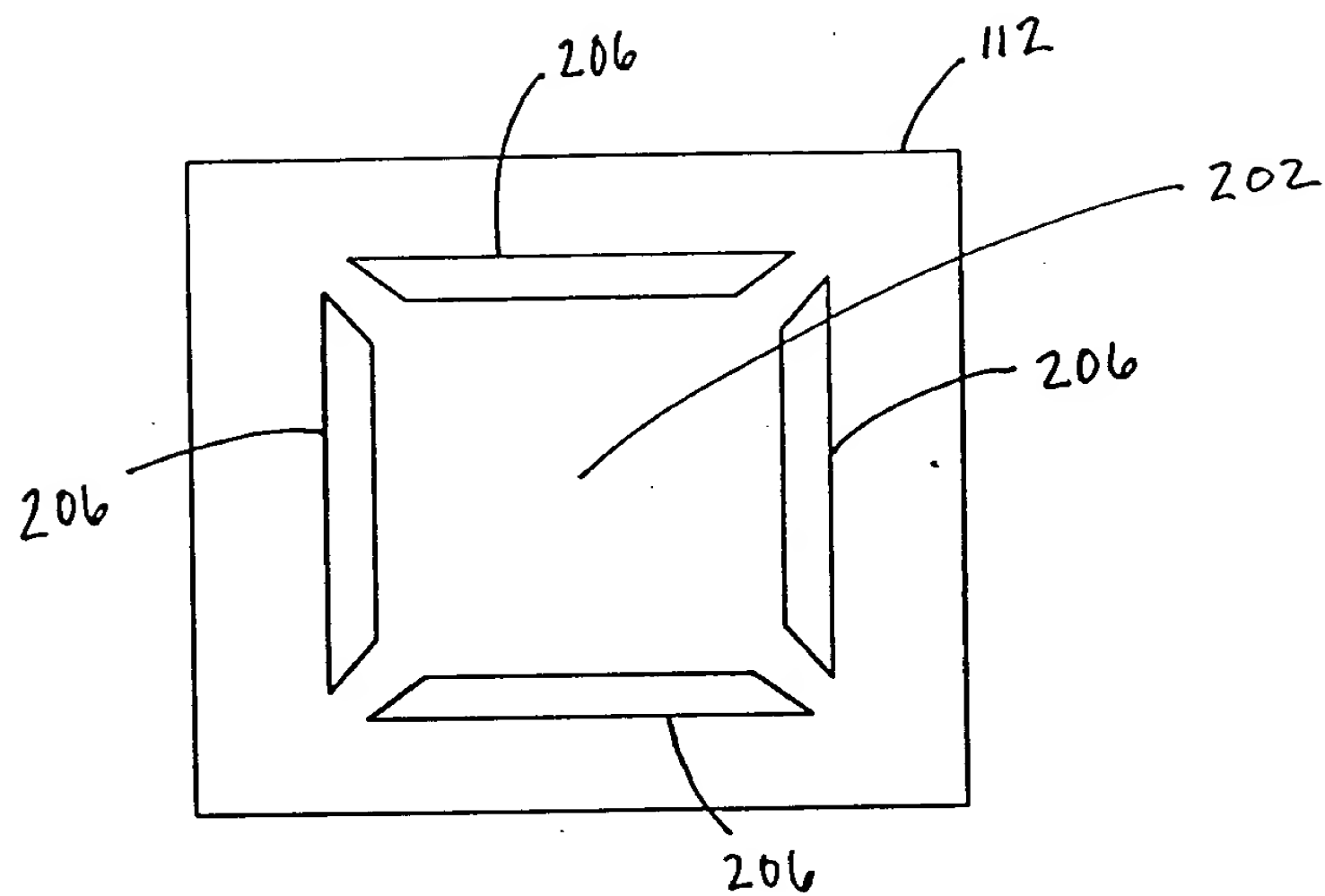


FIG. 2C

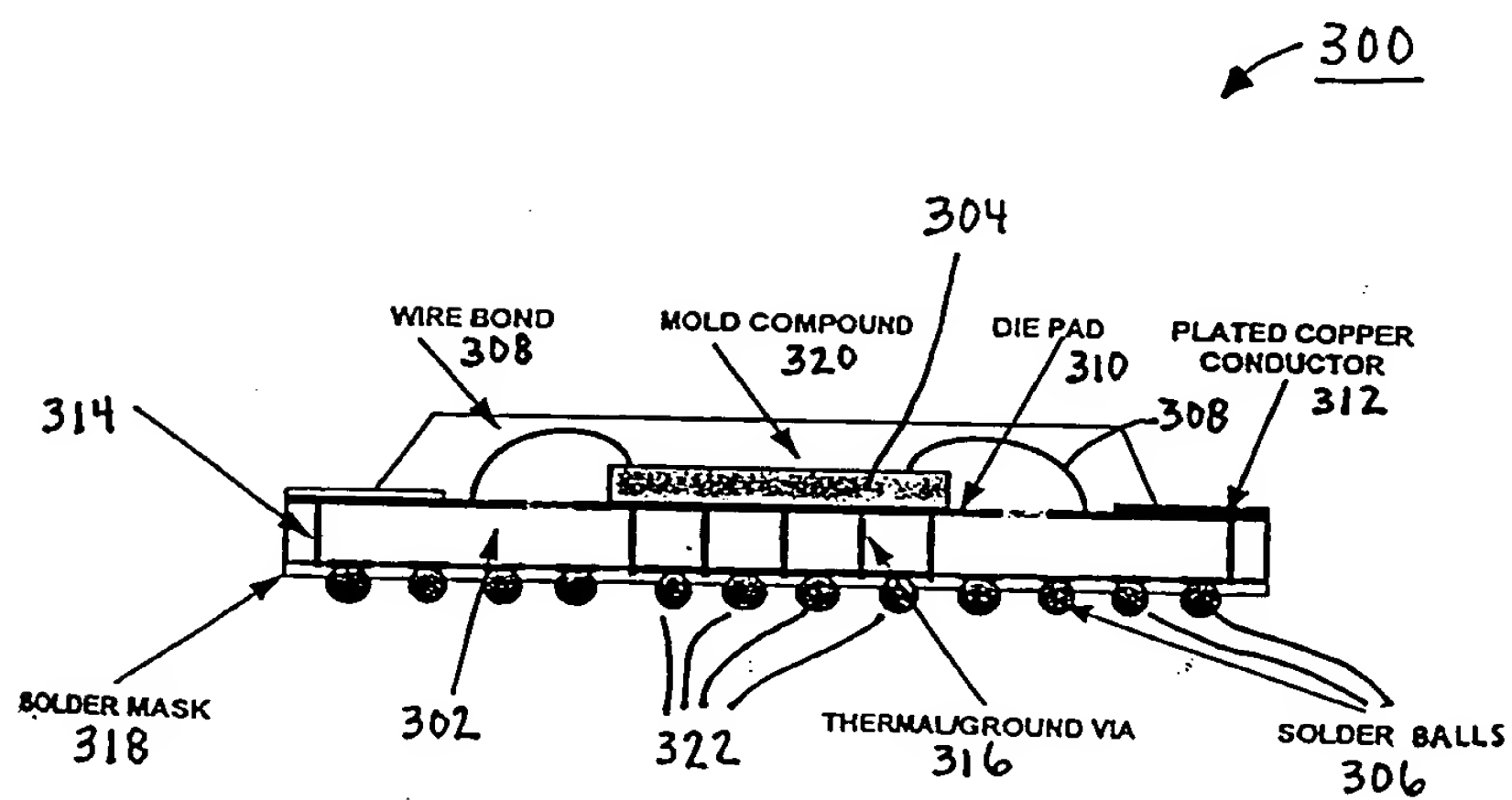


FIG. 3

00222T 99E24/60

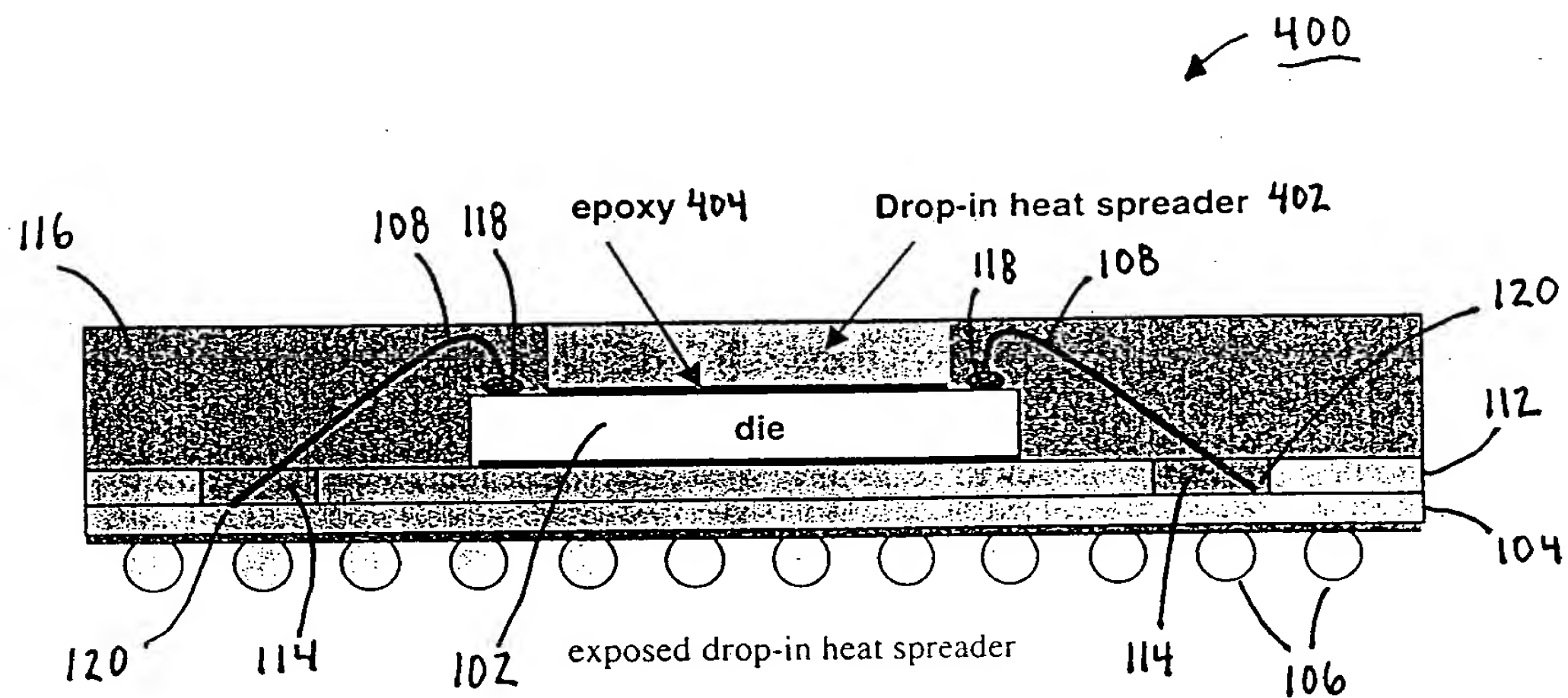


FIG. 4

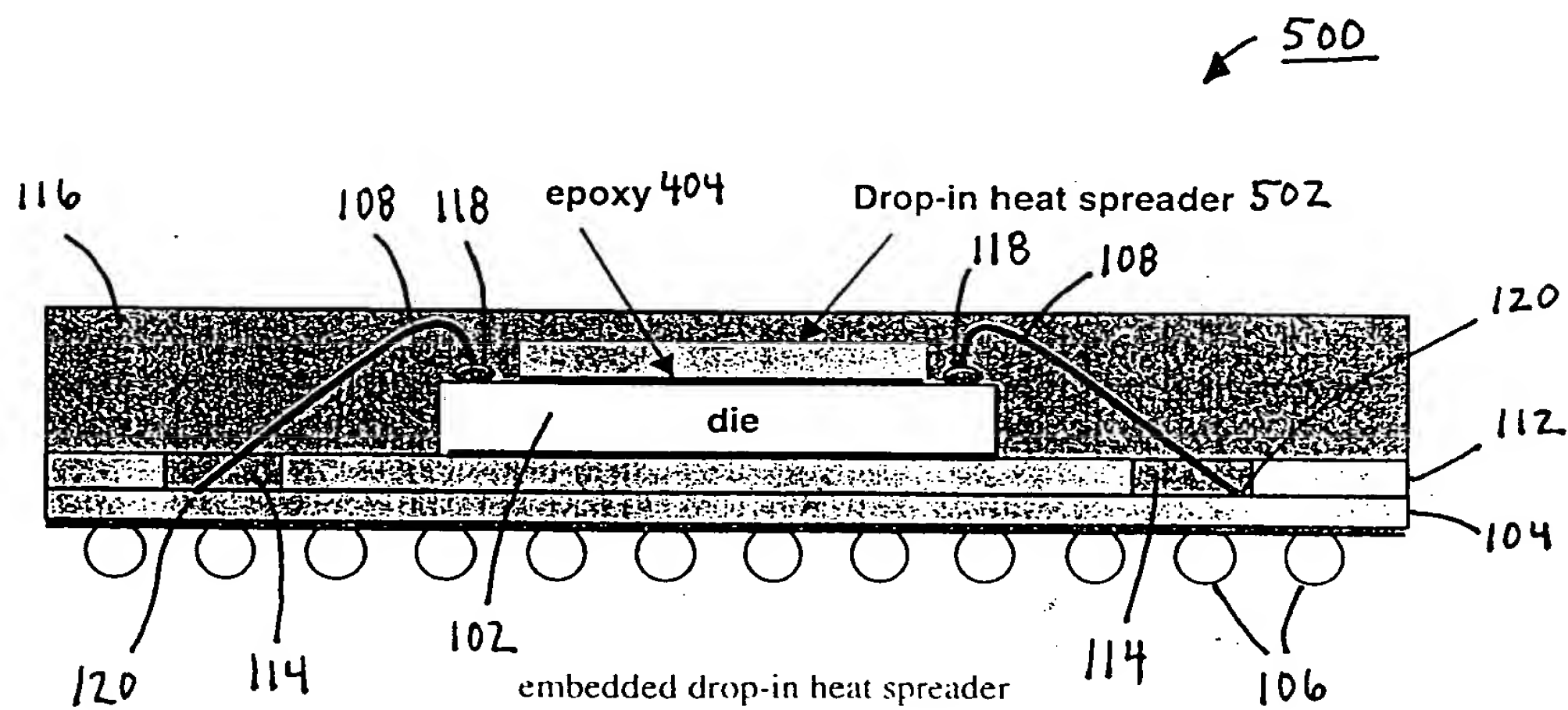


FIG. 5

09742366-122200

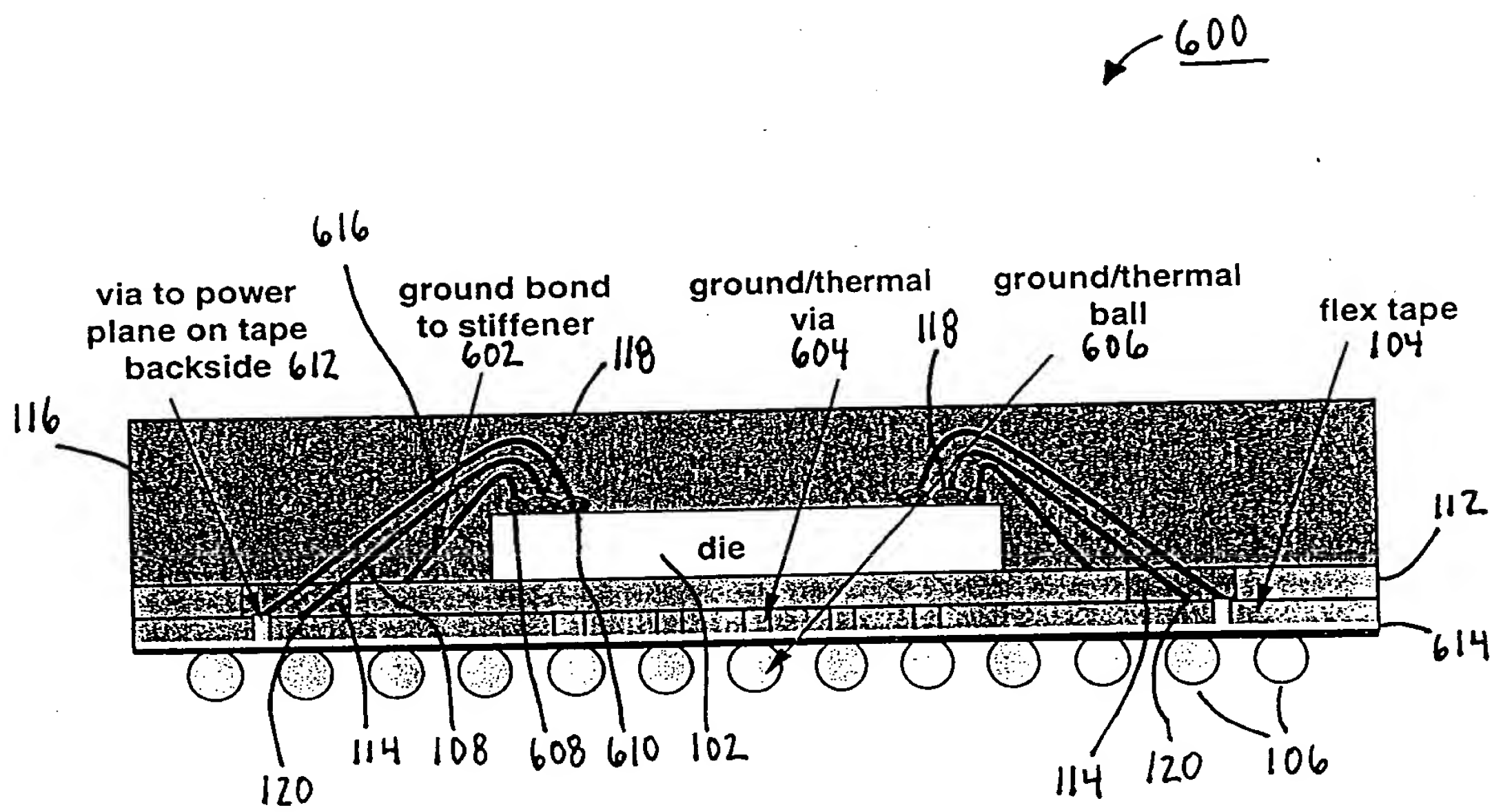


FIG. 6

00222T 982460

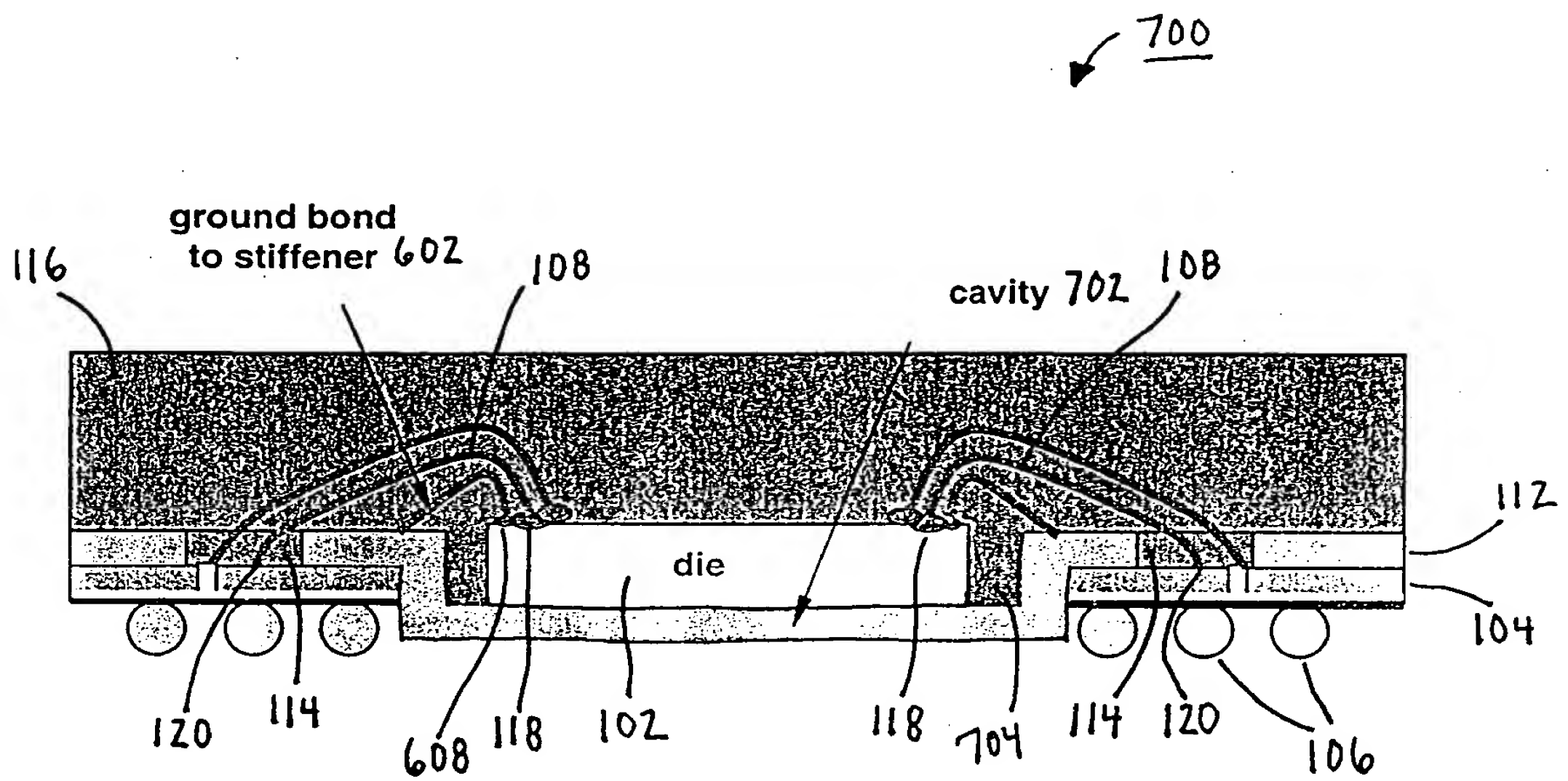


FIG. 7

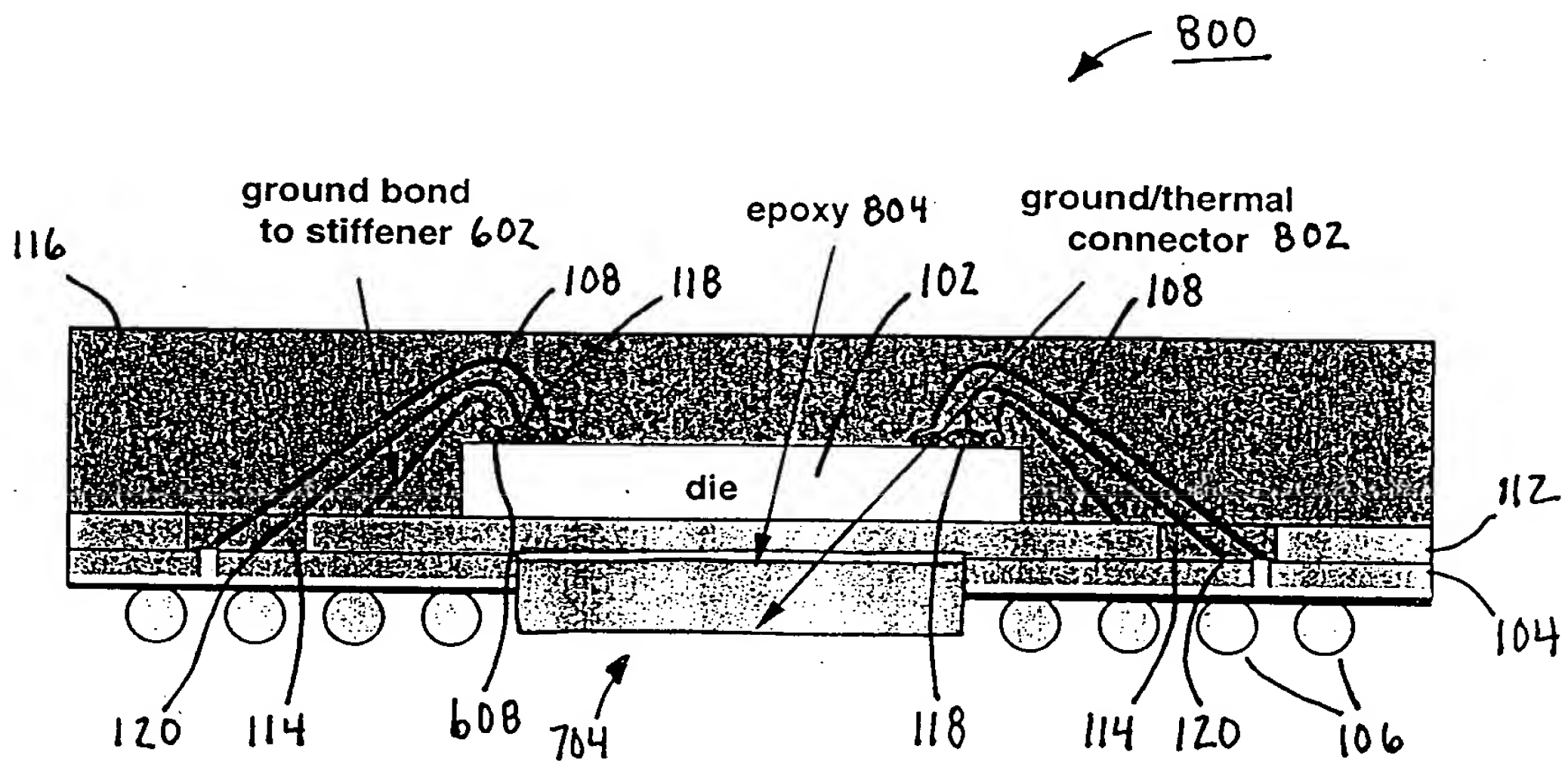


FIG. 8

09742366-122200

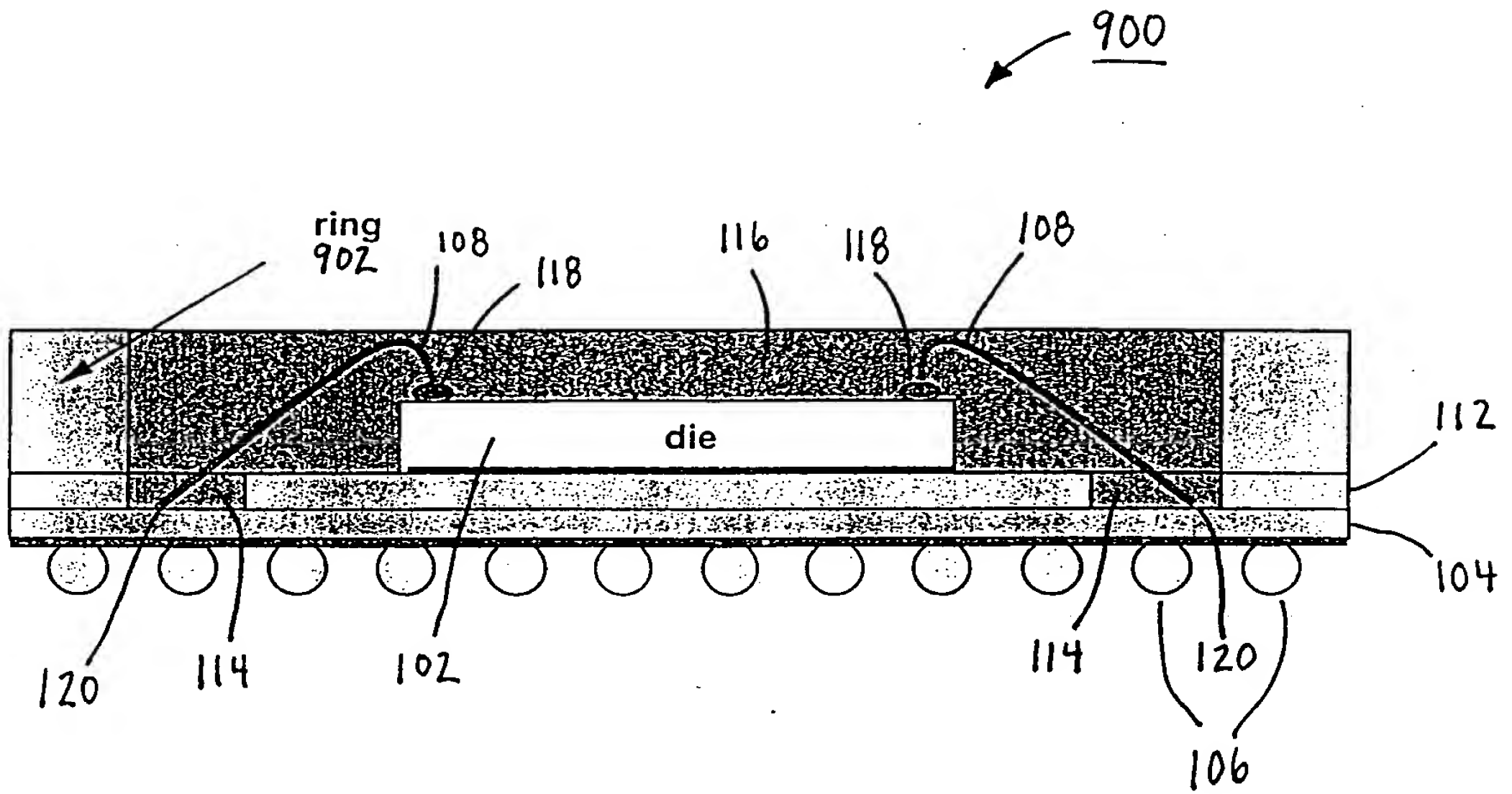


FIG. 9A

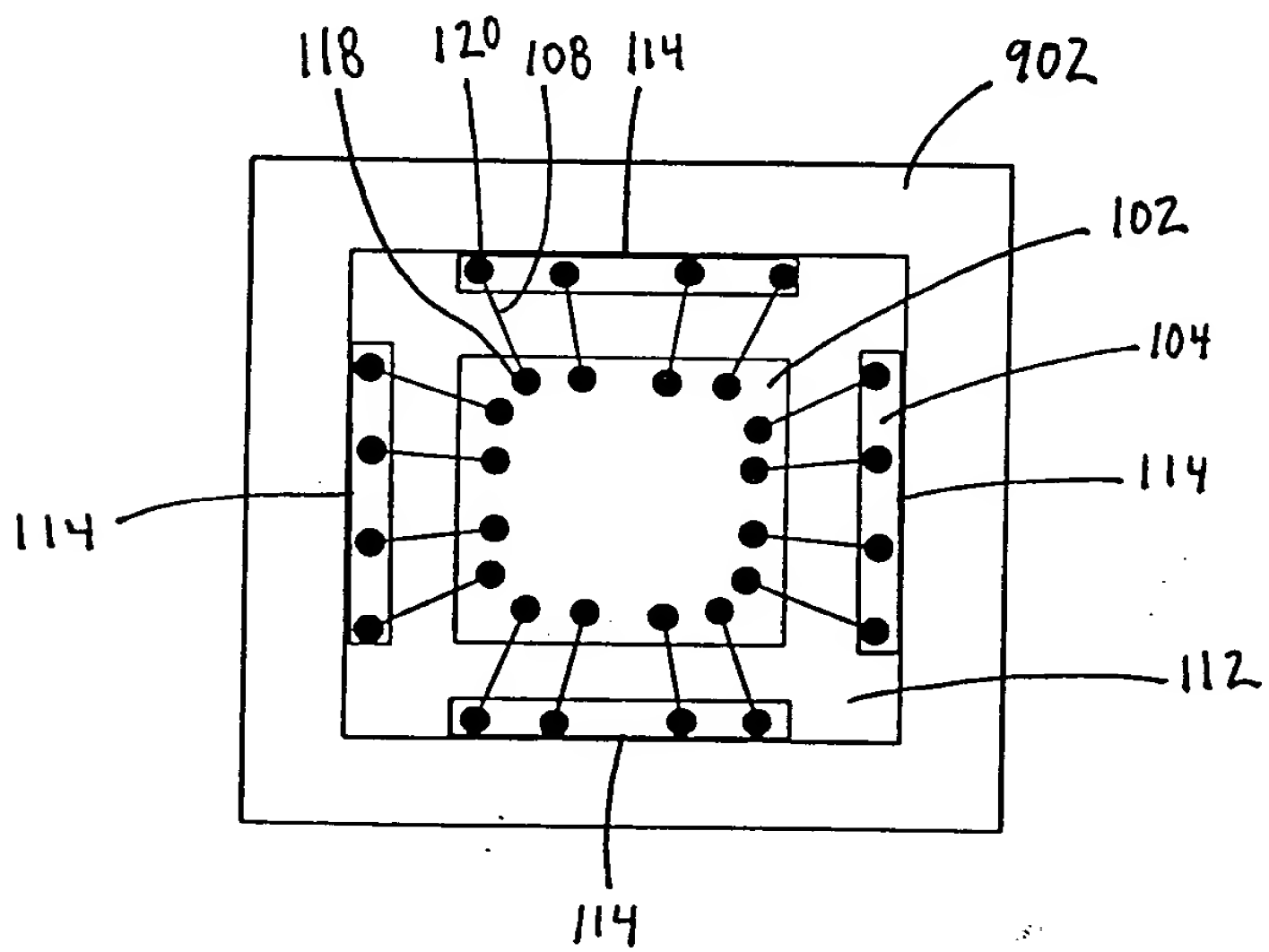


FIG. 9B

09742365-122200

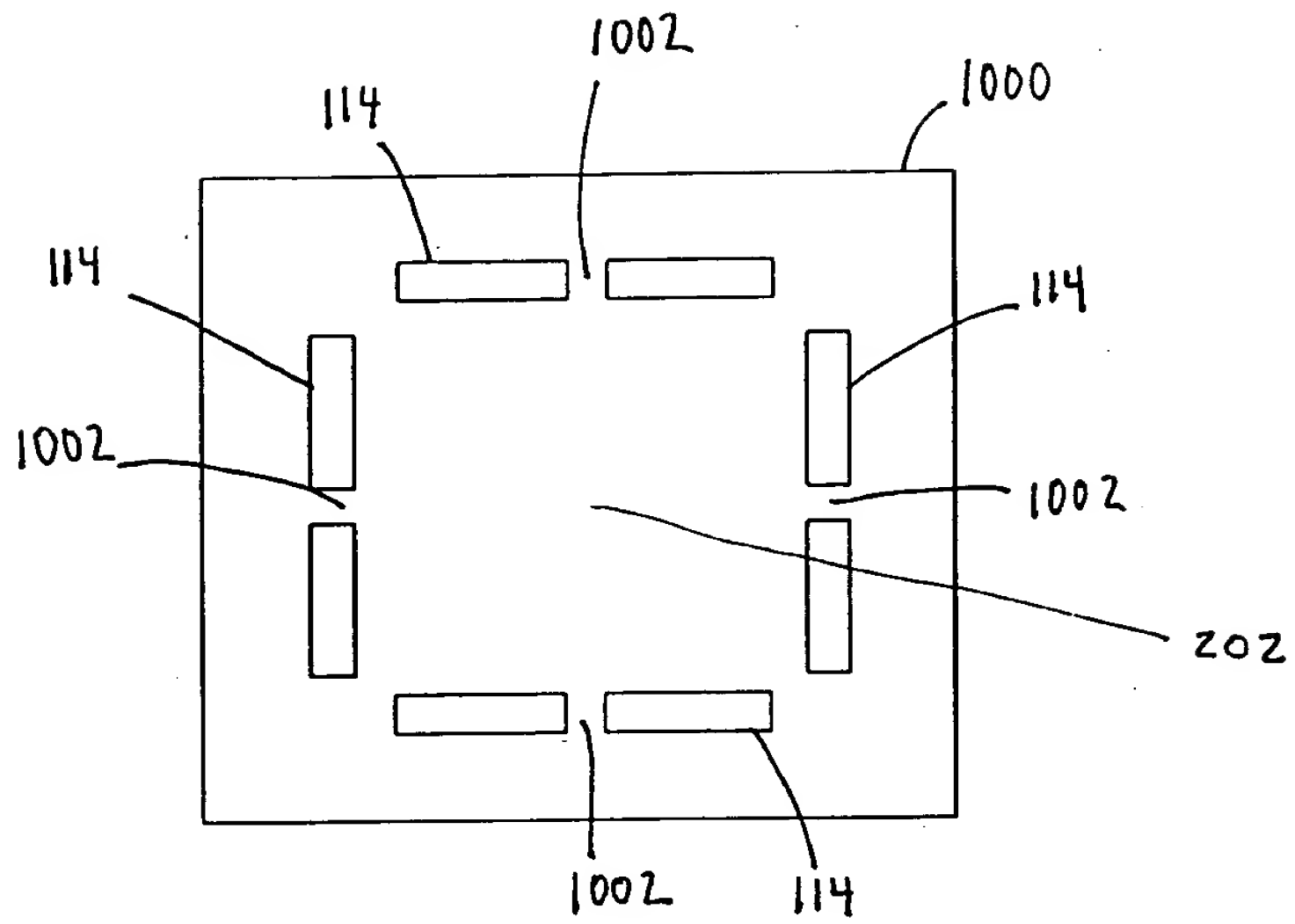


FIG. 10A

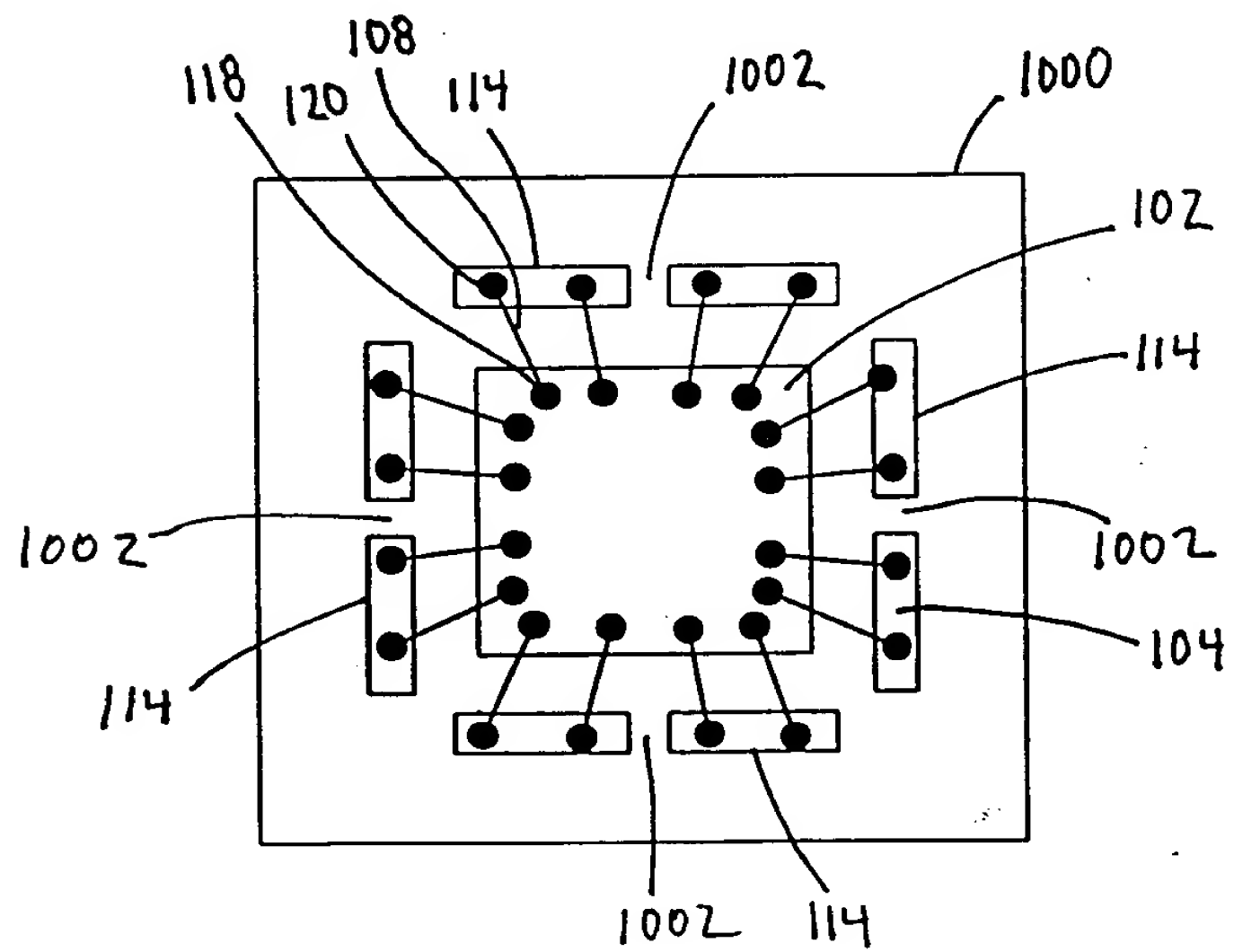


FIG. 10B



00222T 9924260

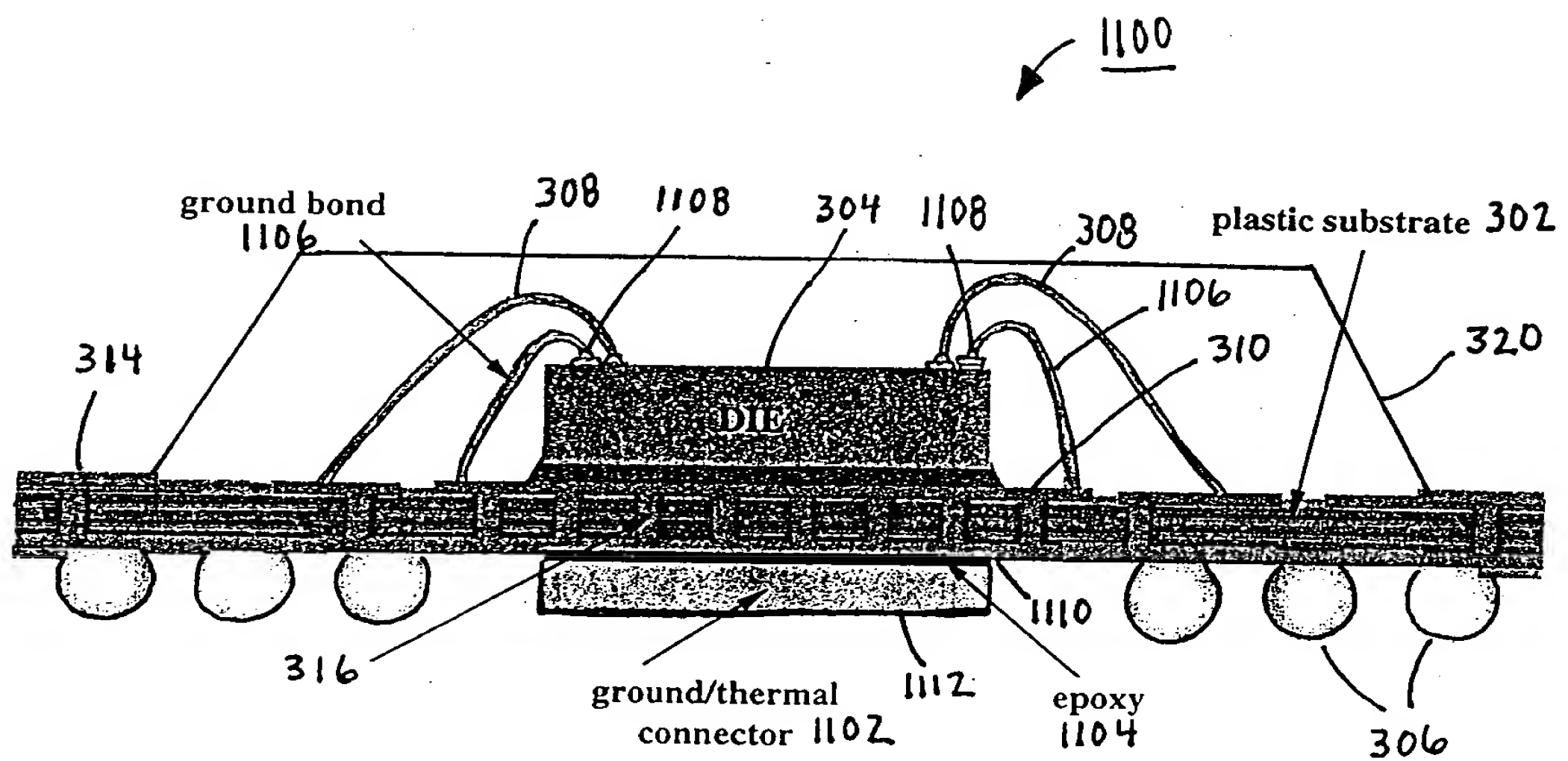


FIG. 11

0974-2366-12200

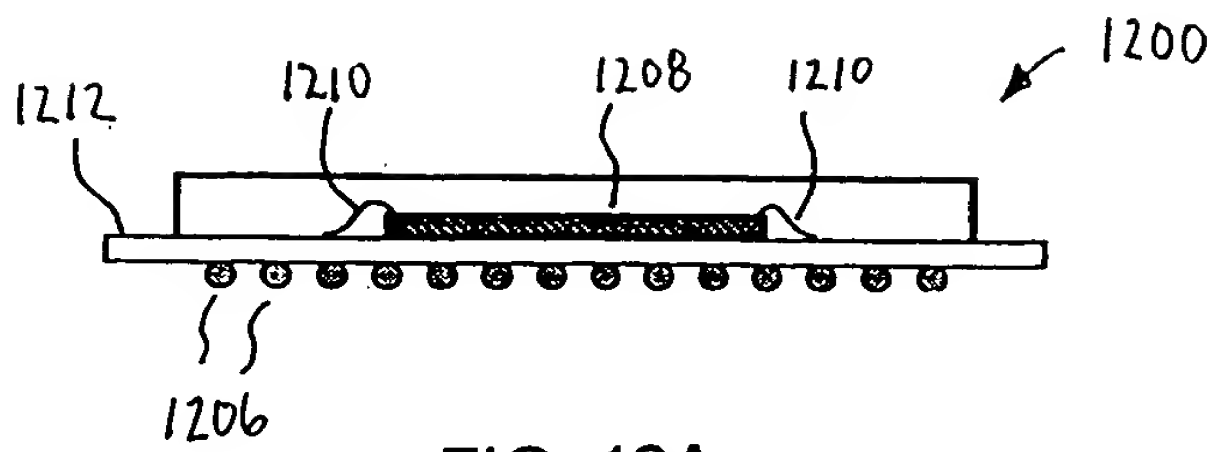


FIG. 12A

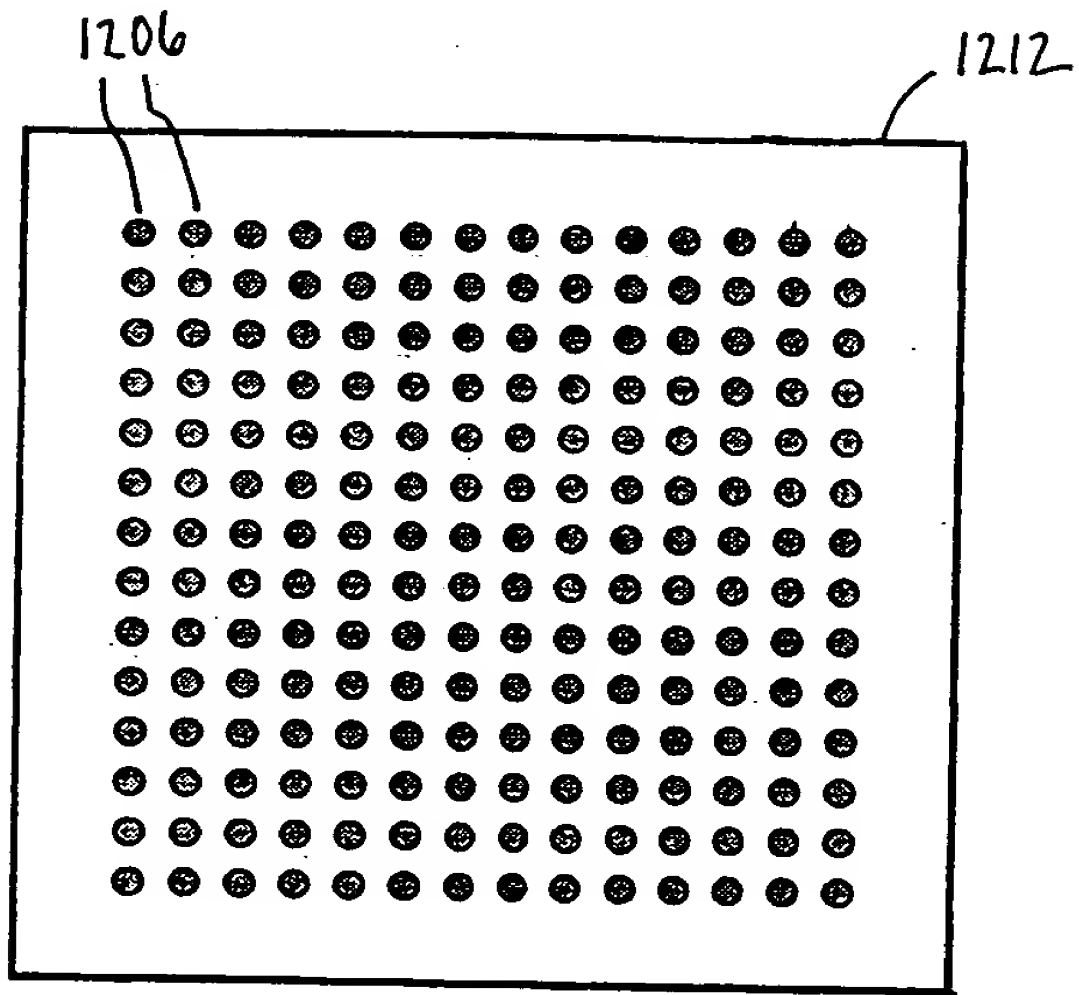


FIG. 12B

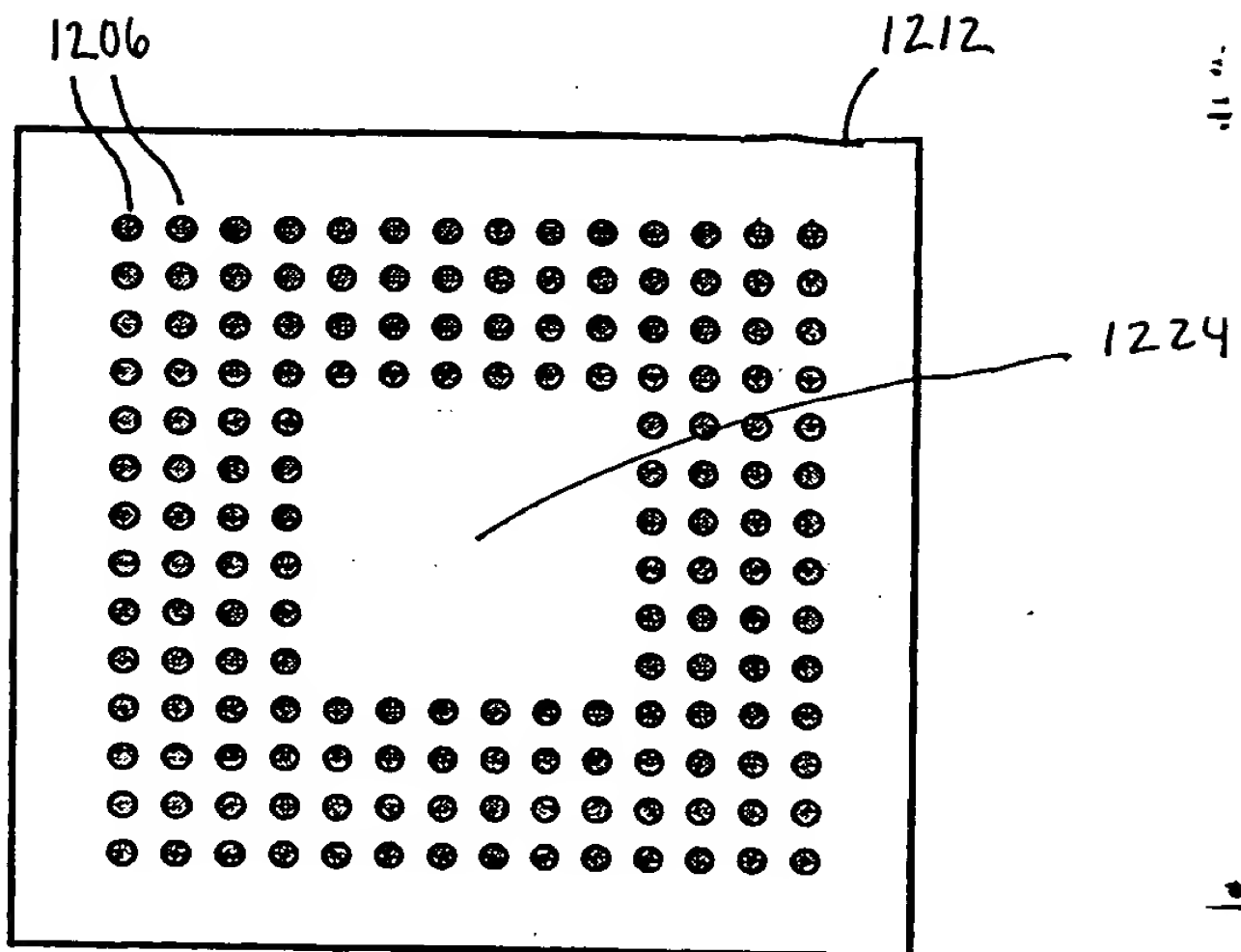


FIG. 12C

09742365, 122200

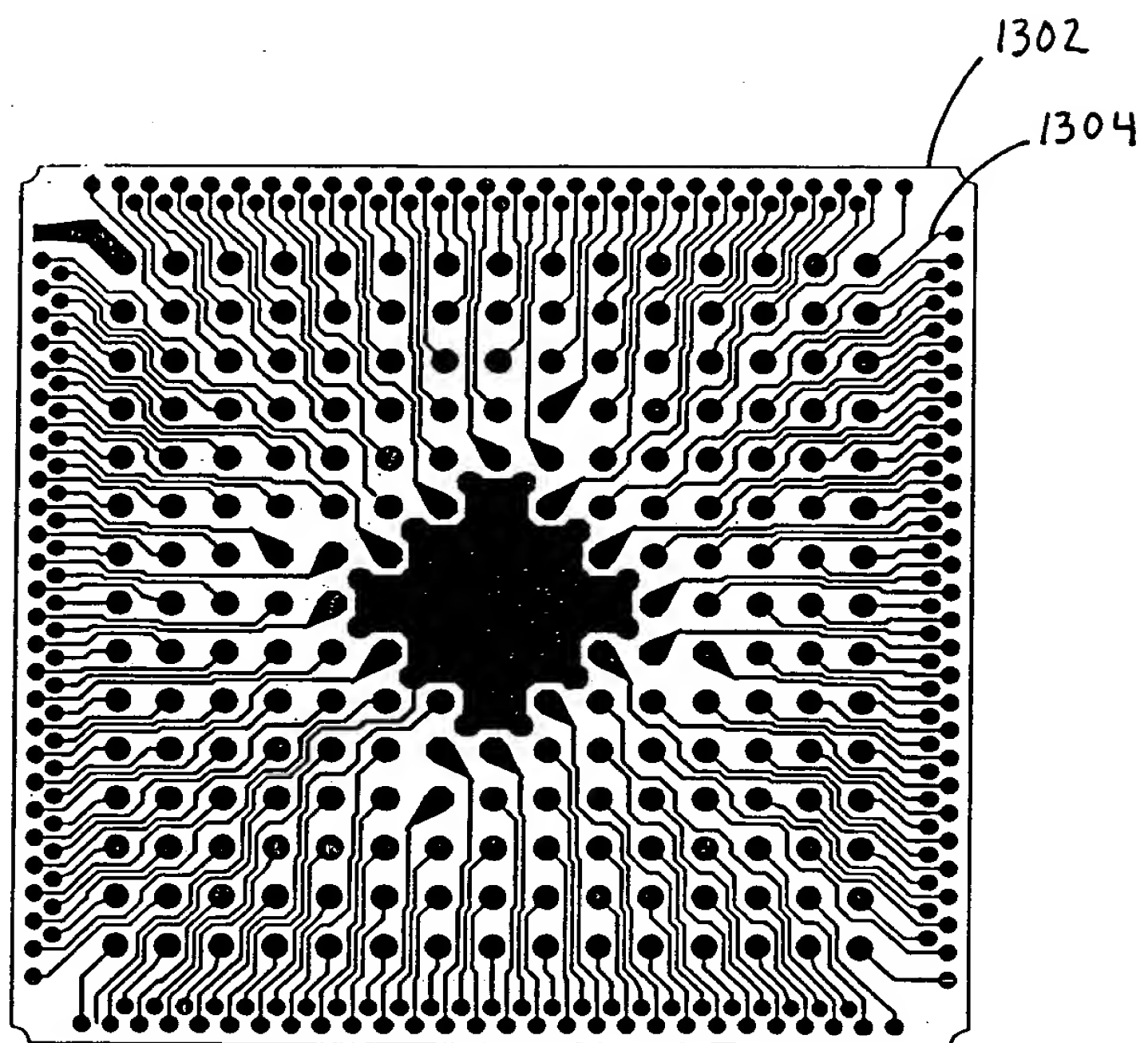


FIG. 13

1400

1402

a substrate that has a first surface and a second surface is provided

1404

a first surface of a stiffener is attached to the first substrate surface

1406

an IC die is mounted to the second stiffener surface

1408

a heat spreader is mounted to the IC die, wherein the heat spreader dissipates heat from the IC die

1410

a plurality of solder balls are attached to the second substrate surface

FIG. 14

1500

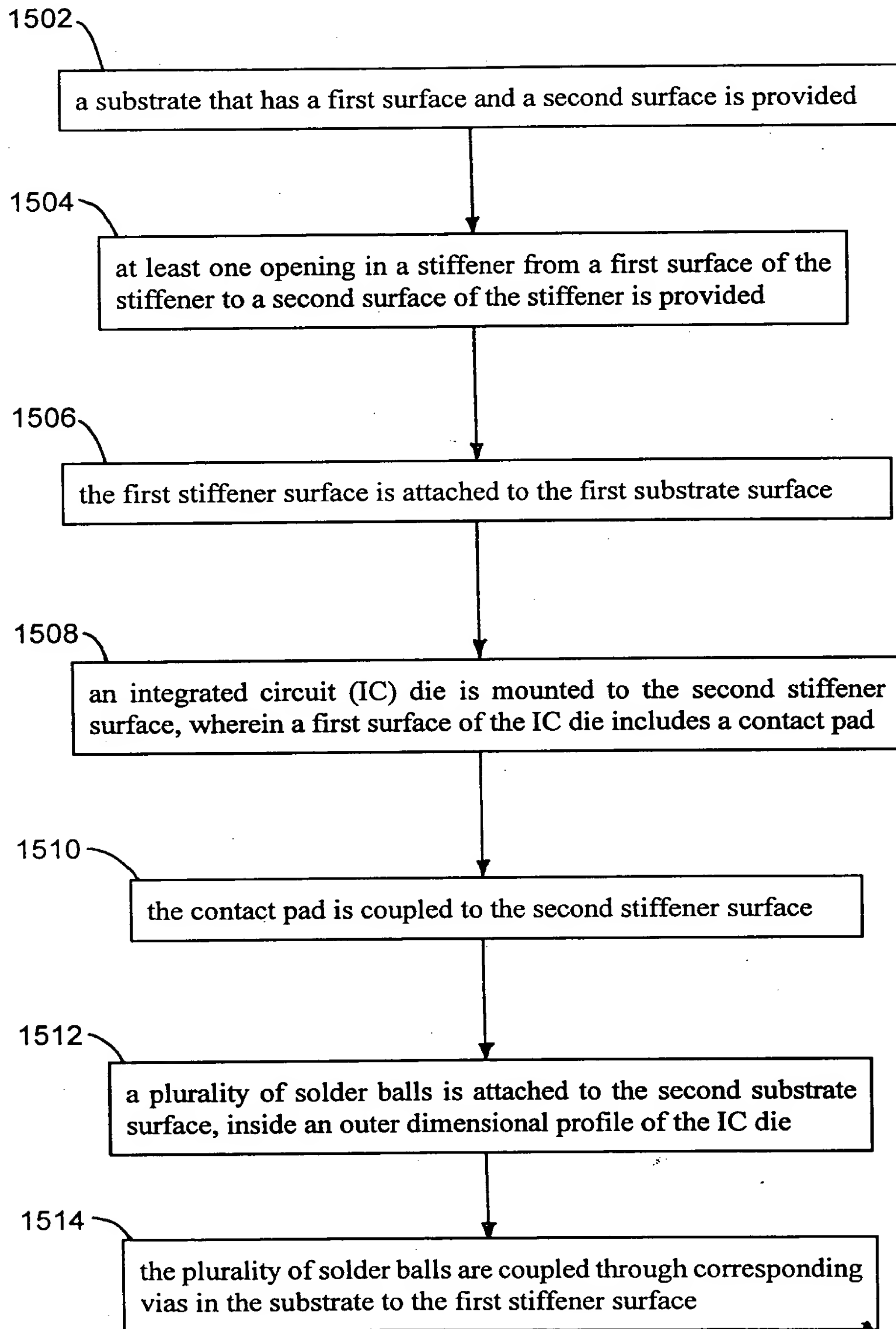


FIG. 15

1600

1602

a substrate that has a first surface and a second surface is provided

1604

a first surface of a stiffener is attached to the first substrate surface

1606

a portion of the first stiffener surface is exposed through a window opening in the substrate

1608

an IC die is mounted to a second surface of the stiffener, wherein a surface of the IC die includes at least one contact pad

1610

a plurality of solder balls are attached to the second substrate surface

1612

the exposed portion of the first stiffener surface is configured to be coupled to a printed circuit board (PCB), whereby electrical and thermal performance of the BGA package is improved

FIG. 16A

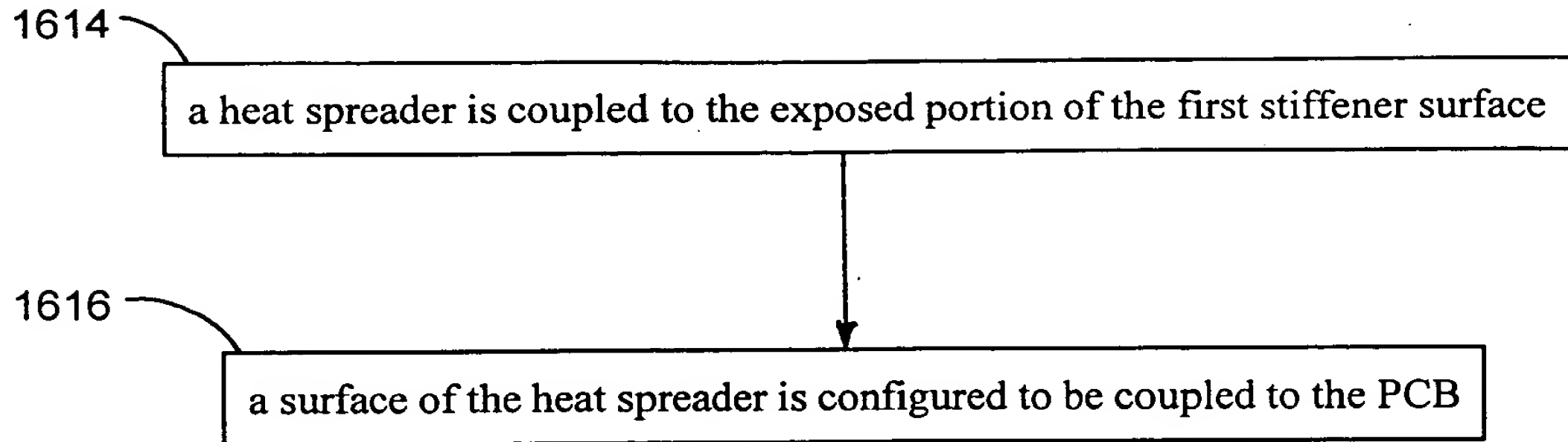


FIG. 16B

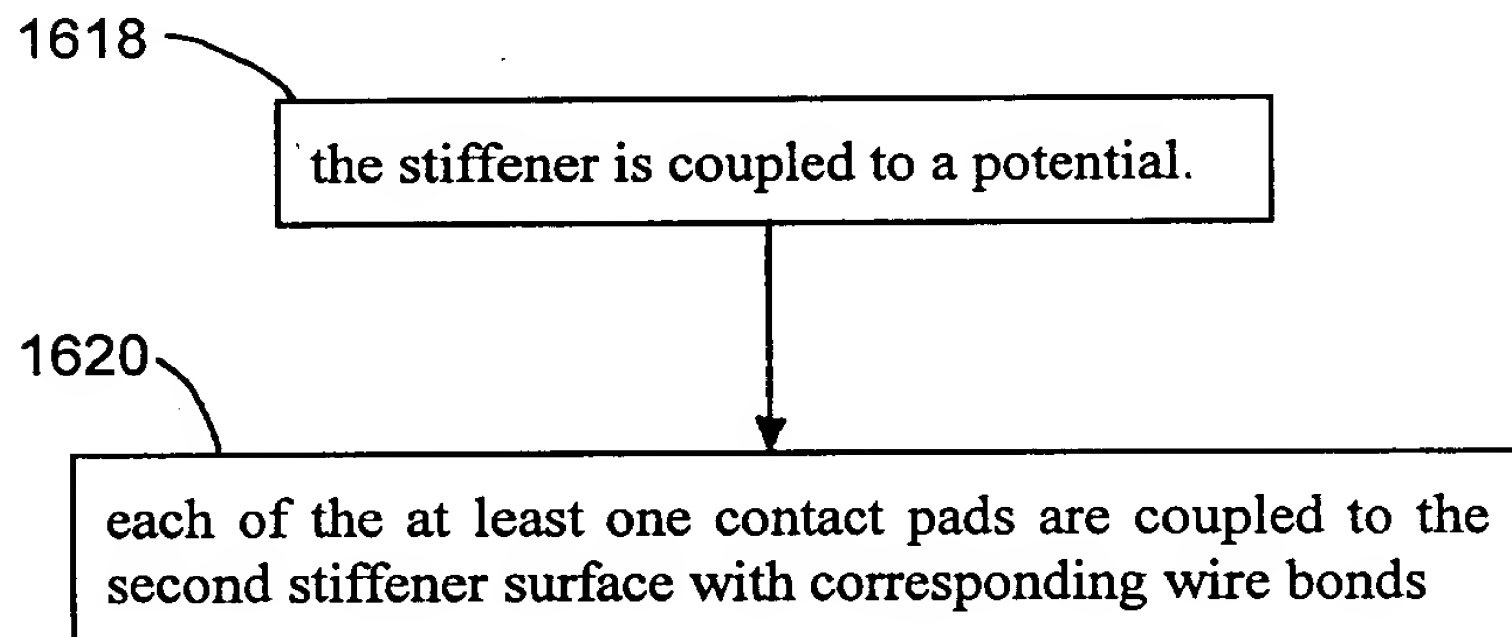


FIG. 16C

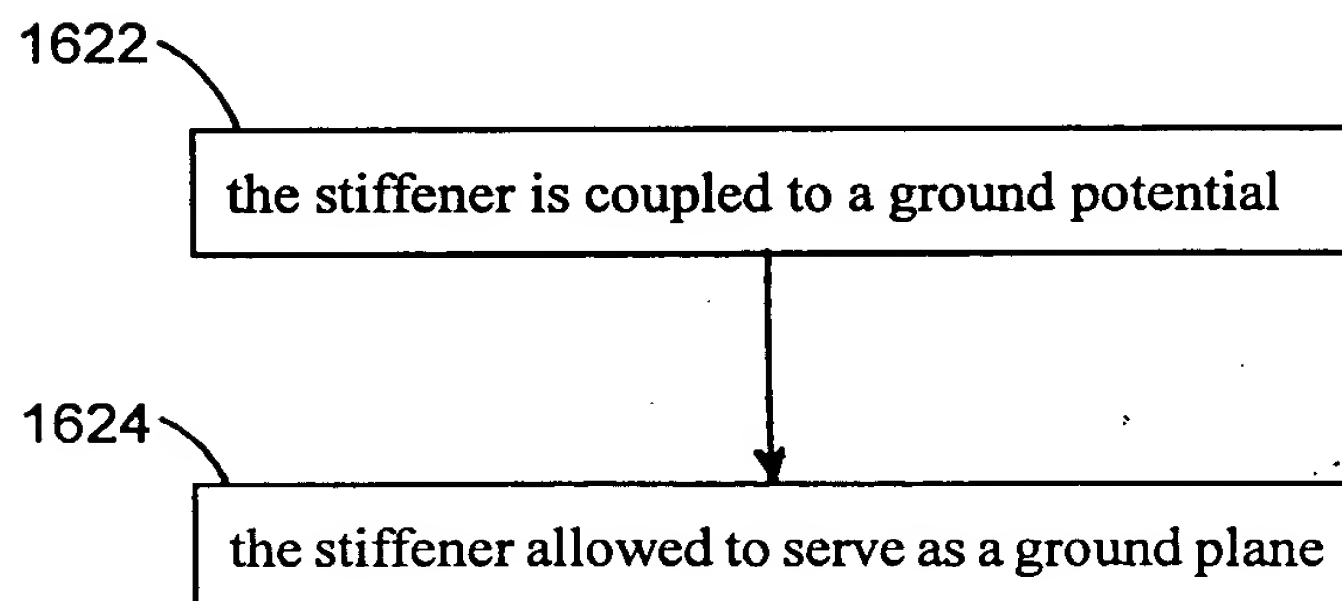


FIG. 16D

1700 →

1702

a substrate that has a first surface and a second surface is provided

1704

a first surface of a stiffener is attached to the first substrate surface

1706

an IC die is mounted to the first stiffener surface

1708

a plurality of solder balls are attached to the second substrate surface

1710

a metal ring is attached to the first stiffener surface

FIG. 17



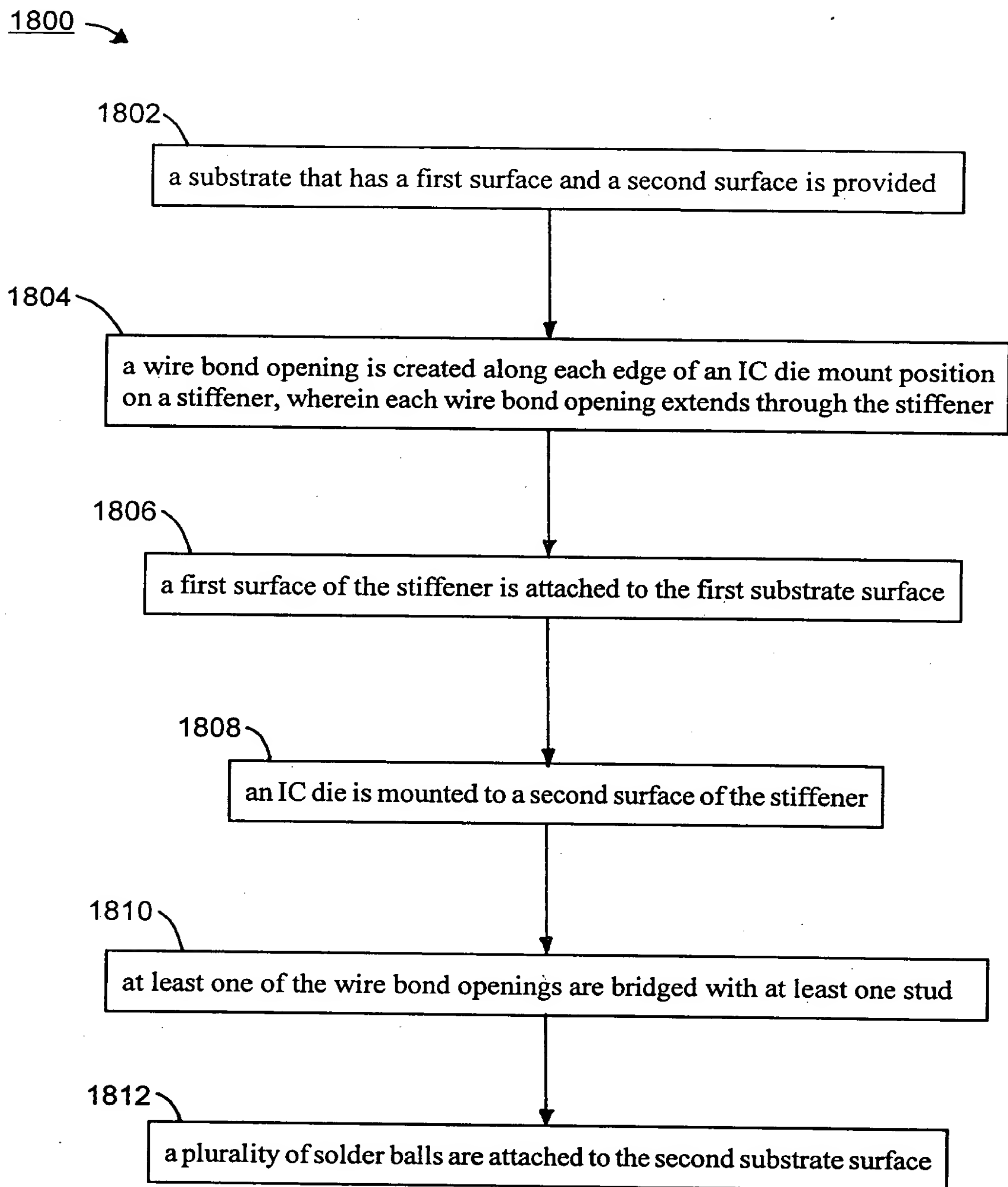


FIG. 18

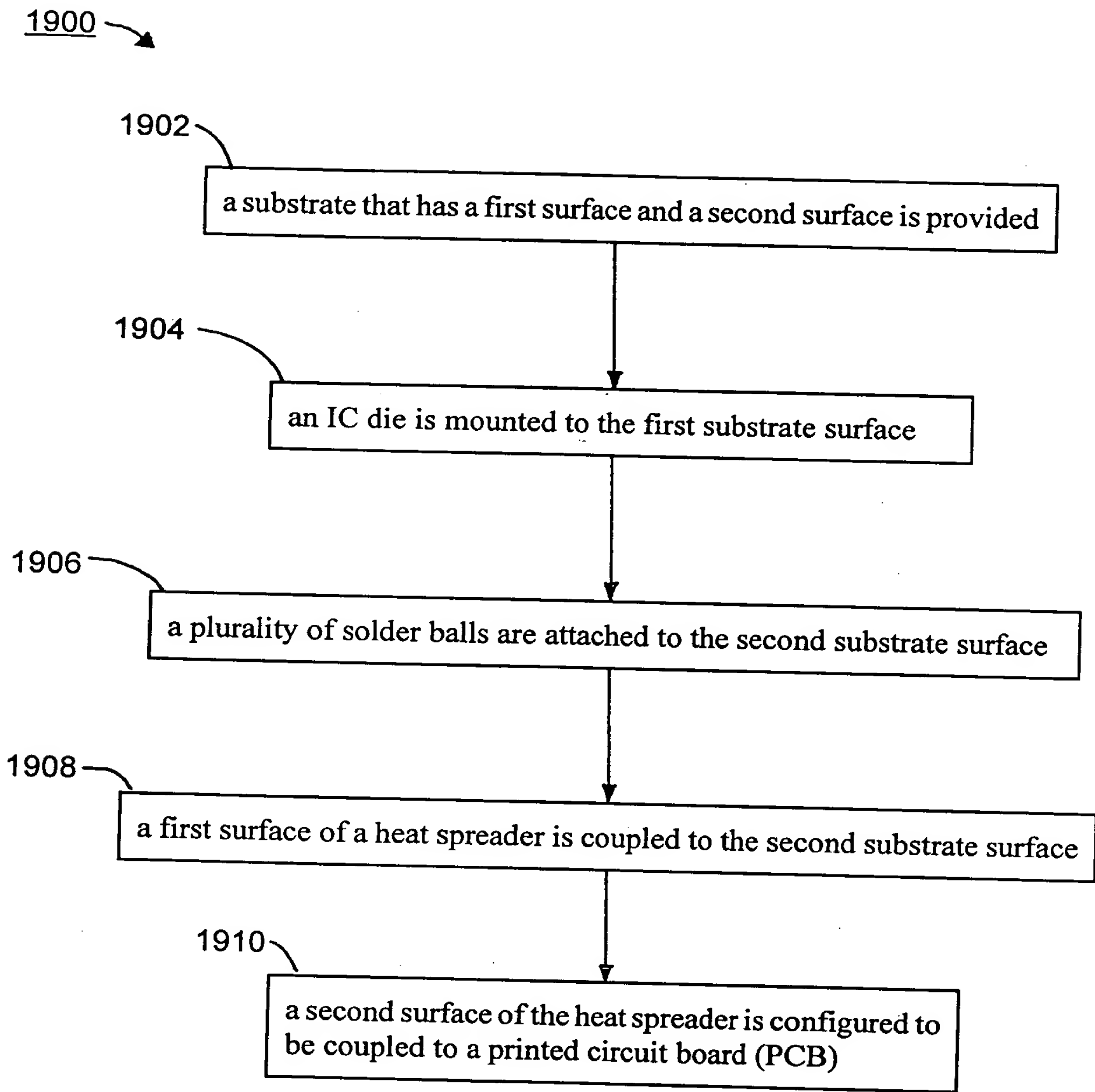


FIG. 19A

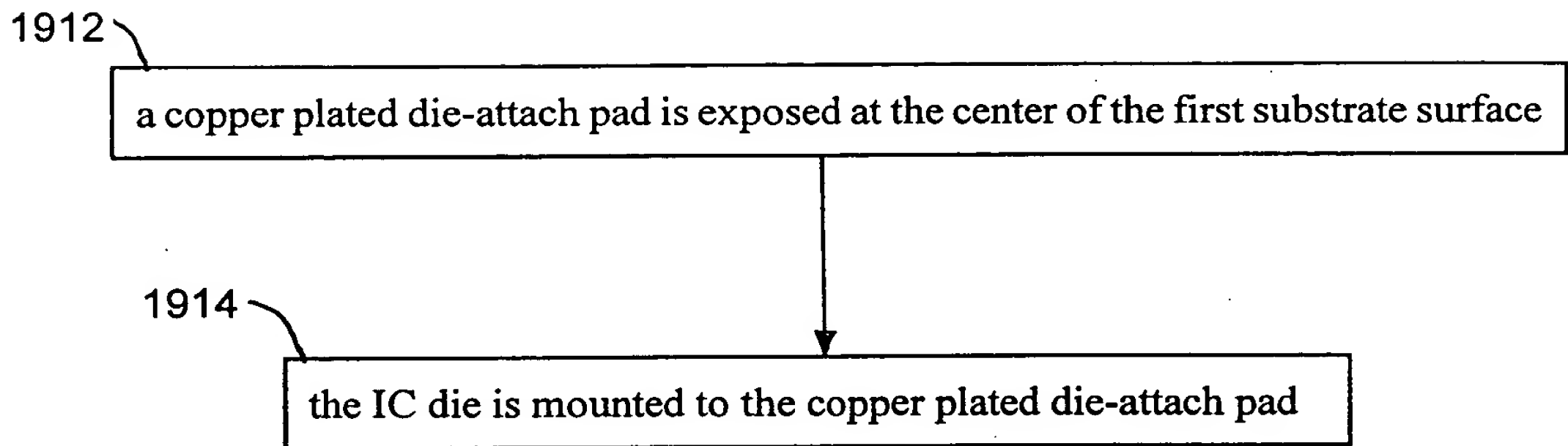


FIG. 19B

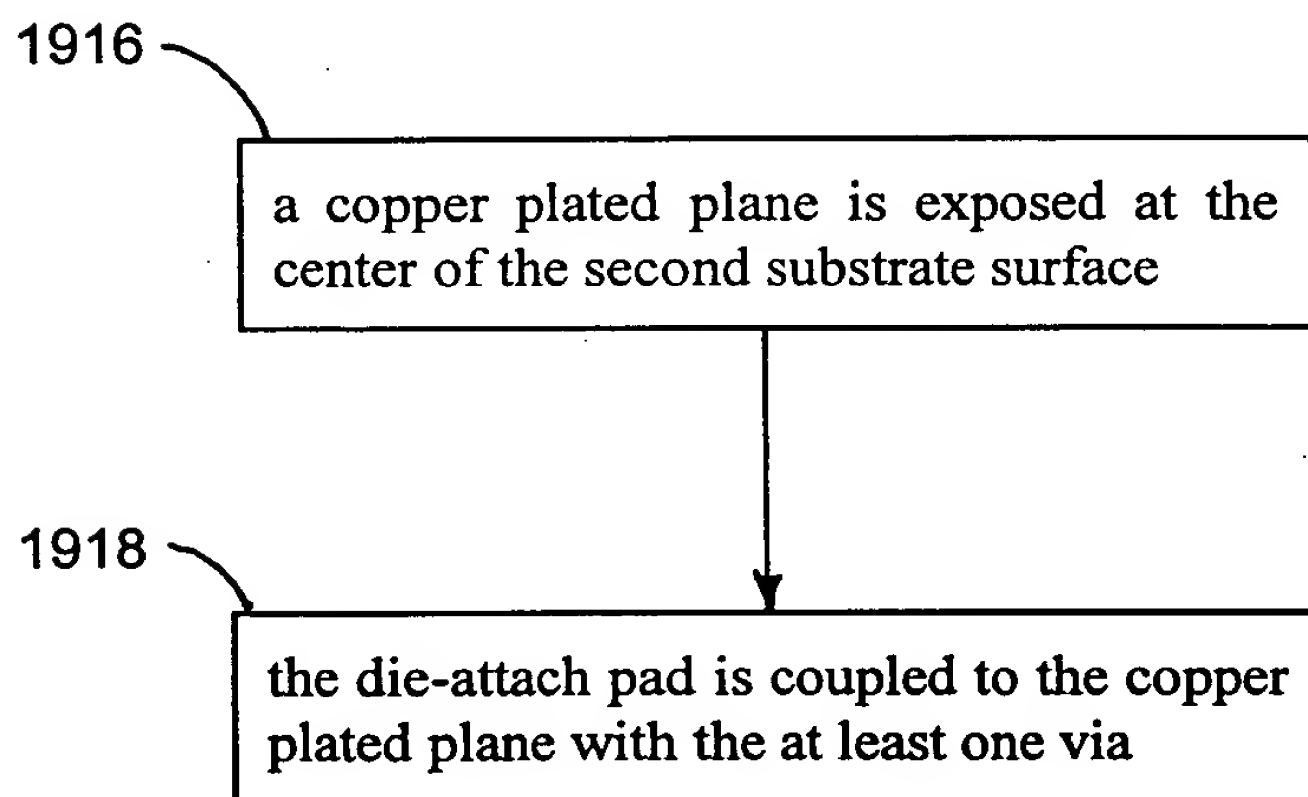


FIG. 19C

00227 992460

0974236-12200

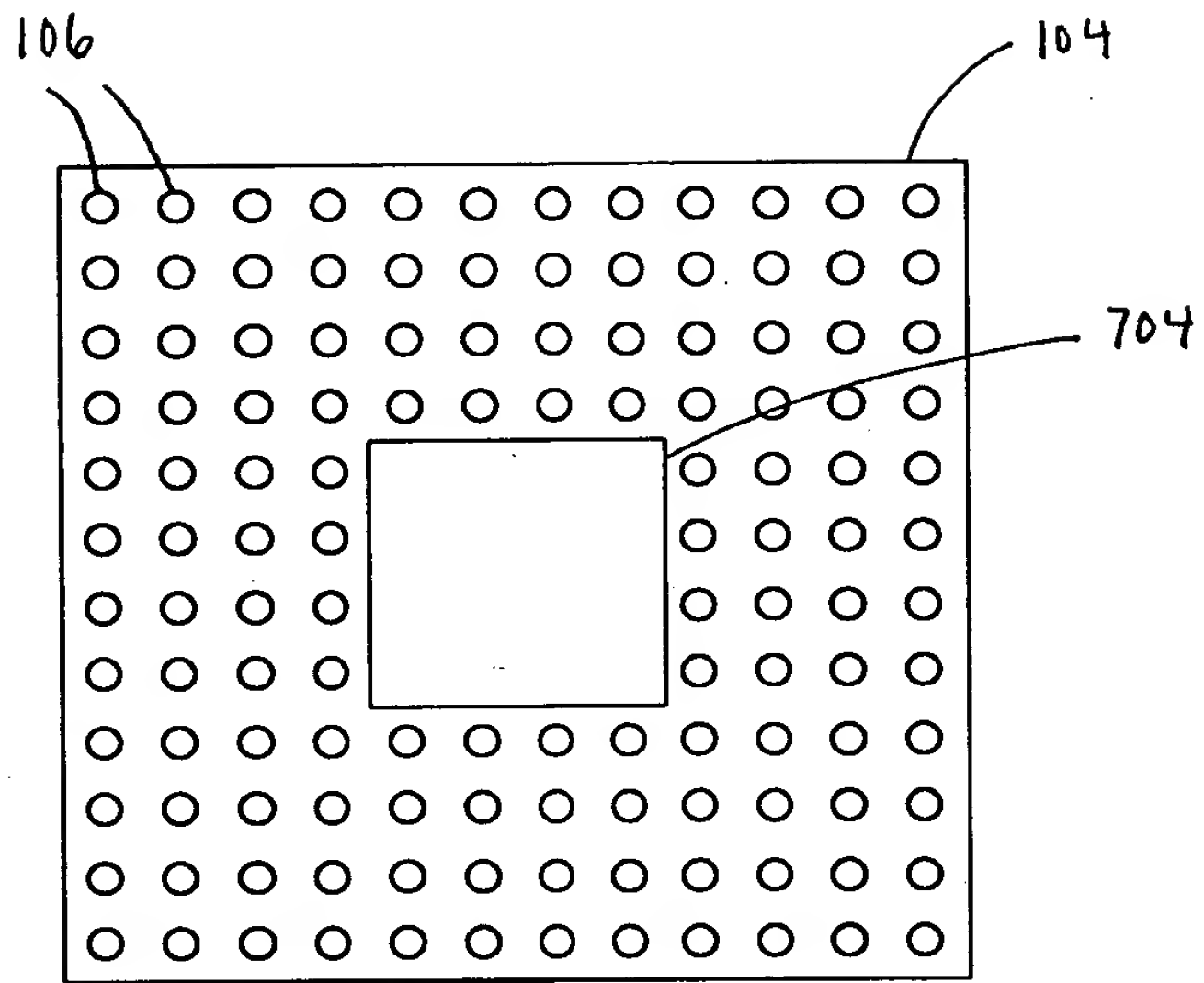


FIG. 20

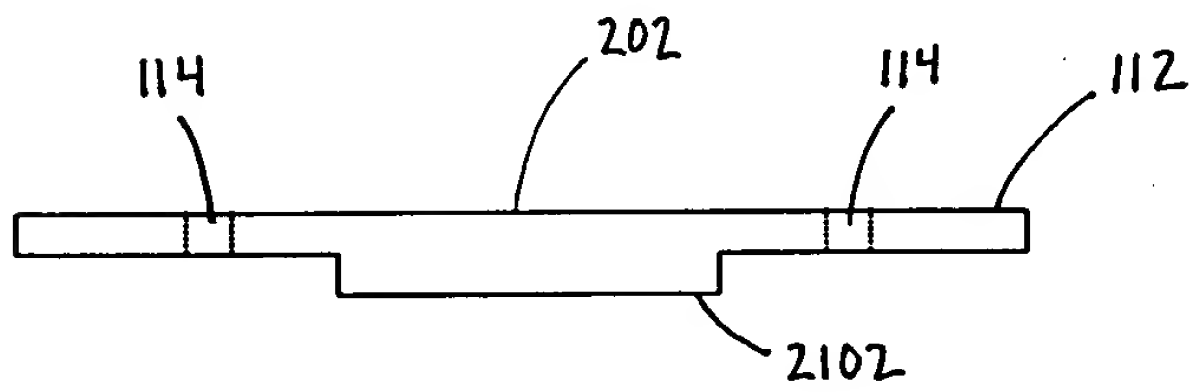


FIG. 21